

REMARKS

Entry of the present amendment and reconsideration and allowance of this application are requested.

1. Discussion of Claim Amendments

Pending independent claim 1 has been revised so as to include therein the substance of prior claims 2 and 7-9. As such, claims 2 and 7-9 have been cancelled as redundant.

Redundant expressions have also been cancelled from claim 5. The dependencies of claims 10 and 11 have been adjusted accordingly. In addition, claim 15 has been made dependent from the amended version of claim 1 and revised so as to be commensurate with the language therein.

Accordingly, following entry of this amendment, claims 1, 3-6 and 10-18 will remain pending herein for consideration.

2. Response to Substantive Rejections

(A) The Examiner's position

The Examiner cites the following references and asserts that the present invention lacks is anticipated (35 USC §102(b)) and/or rendered obvious (35 USC §103(a)) thereover.

- (i) Harashina (USP 6,753,363(WO 2001/05888))
- (ii) Schuette et al. (USP 4,386,178)
- (iii) Sugiyama et al. (USP 4,929,712)

(B) Discussion of the Cited references

(i) Harashina (USP 6,753,363) discloses a polyacetal resin composition comprising a polyacetal resin, a flame retardant, and a basic nitrogen-containing compound, wherein the flame retardant comprises a phosphorus-containing compound and an aromatic compound which accelerates flame retardation in association with the phosphorus-containing compound, wherein the proportion of the phosphorus-containing compound is 1 to 500 parts by weight per 100 parts by weight of the aromatic compound, and the total amount of the phosphorus-containing compound and the aromatic compound is 1 to 100 parts by weight, and wherein the proportion of the nitrogen-containing compound is 0.01 to 80 parts by weight per 100 parts by weight of the polyacetal resin (claim 1).

Harashina also discloses the following:

"The second characteristic of the present invention resides in that not only the flame retardancy and self-extinguishability but the flame retardancy of the polyacetal resin is multiplicatively improved and the stability is further enhanced by the combined use of the flame retardant and a basic nitrogen-containing compound...the basic nitrogen-containing compound is preferred to be urea or its derivative, imidazolone or its derivative ... hydrazine or its derivative"
(column 26, lines 22-59)

The hydrazine and its derivatives are a variety of compounds having a hydrazino or hydrazono group, e.g., hydrazides (column 29, line 63 to column 30, line 6) such as monocarboxylic acid hydrazides (e.g., acetic acid hydrazide, palmitic acid hydrazide, stearic acid hydrazide, ethyl carbazate, and other C₂₋₂₂ aliphatic monocarboxylic acid hydrazides, benzoic acid hydrazide, salicylic acid hydrazide, p-hydroxybenzoic acid

hydrazide, l-naphthoic acid hydrazide, nicotinic acid hydrazide, and other C₆₋₂₀ aromatic carboxylic acid hydrazides), polycarboxylic acid hydrazides (e.g., oxalic acid, malonic acid, succinic acid, glutaric acid, adipic acid, pimelic acid, suberic acid, azelaic acid, sebacic acid, dodecanedioic acid, dimeric acid, tartaric acid, malic acid, iminodiacetic acid, citric acid, nitriloacetic acid, ethylenediaminetetraacetic acid, and other mono- and polyhydrazides of C₂₋₄₀ saturated aliphatic polycarboxylic acids and ester derivatives thereof (e.g., C₂₋₂₀ saturated aliphatic dicarboxylic acid dihydrazides), cyclohexanedicarboxylic acids, cyclohexanetricarboxylic acids, and other mono- and polyhydrazides of C₆₋₁₆ alicyclic polycarboxylic acids and ester derivatives thereof, maleic acid, itaconic acid, and other mono- and polyhydrazides of C₄₋₂₀ unsaturated polycarboxylic acids and ester derivatives thereof, phthalic acid, isophthalic acid, terephthalic acid, naphthalenedicarboxylic acids, biphenylenedicarboxylic acids, trimellitic acid, pyromellitic acid, 1,4,5, 8—naphthoic acid, pyridinedicarboxylic acids, and other mono- and polyhydrazides of C₇₋₁₆ aromatic polycarboxylic acids and ester derivatives thereof) (column 30, lines 7-32).

Harashina also discloses that the resin composition may contain at least one member selected from a variety of additives such as drip inhibitors, antioxidants, heat stabilizers, and fillers, depending on the intended, use thereof (column 31, lines 52-56).

Furthermore, to the resin composition may be added a colorant, a weather C light) resistant stabilizer, a heat stabilizer, a mold releasing agent, a nucleation agent, an antistatic agent, a surfactant, an electroconducting agent, a slip agent..., a fluorescent whitening agent, an inhibitor for inhibiting a phosphoric acid derivative from being formed from a phosphine .. , impact resistance improvers (column 35, lines 37-54)

Regarding the effects of the disclosed compositions, Harashina discloses that:

"since a flame retardant constituted of a phosphorus-containing compound and the specific aromatic compound,

and a basic nitrogen-containing compound are used in combination, it is made possible to give high flame retardancy and stability to a polyacetal resin. It is also possible to make, without adversely affecting its inherent characteristics, a polyacetal resin highly flame retardant and stabilized by adding a small amount of the flame retardant. The heat stability (or fusion stability upon molding) can be further improved by adding additives" (column 37, line 63 to column 38, line 6).

(ii) Schuette et al. disclose a polyacetal molding material containing an antioxidant and a heat stabilizer, which molding material is further stabilized with a melamine resin, which molding material contains from 0.1 to 10% by weight of a melamine-formaldehyde condensate which has a mean degree of polymerization of from 1.2 to 6.0 and a melamine:formaldehyde ratio of from 1:2 to 1:5.5 and which is partially etherified with a C₁-C₄-alkanol so that the ratio melamine:ether radicals is from 1:1.5 to 1:5.0 and that the ratio melamine:free methylol groups is from 1:0.5 to 1:3. (claim 1).

Schuette et al disclose that protection of polyacetals against degradation at elevated temperatures has also been disclosed and stabilizers for this purpose, usually referred to as heat stabilizers in the literature, are, for example, carboxylic acid amides, ... low molecular weight polyamides with blocked end groups ... metal salts of aliphatic, hydroxy- substituted carboxylic acids, condensates of dicarboxylic acid diamides, N,N'-alkylureas and formaldehyde, as well as ureas, thioureas, hydrazines, hydrazides, polyvinylpyrrolidone and many other compounds. (column 1, lines 13-26)

Moreover, polyacetals can additionally contain light stabilizers and UV stabilizers. (column 1, lines 26-27)

Schuette et al. also disclose that in addition to the melamine-formaldehyde resin, the copolymer preferably contains a conventional antioxidant and a conventional heat stabilizer and that the polyacetal can furthermore contain nucleating agents, colorants and/or fillers, for example glass fibers. (column 2, lines 43-49)

Regarding the effects of the disclosed compositions, Schuette et al note that the polyacetals can be repeatedly melt-processed and that the stabilized polyacetals are particularly suitable for the production of moldings which are employed industrially at elevated ambient temperatures. (column 2, lines 61-66).

(iii) Sugiyama et al disclose a polyacetal resin composition prepared by melt-kneading a polyacetal resin (A) (99 to 40 wt. %) with a thermoplastic polyurethane (B) (1 to 60 wt. %) in the presence of a polyisocyanate compound, a polyisothiocyanate compound or a dimer or trimer thereof (C) in an amount of 0.1 to 10 wt.% based on the total of A and B. (claim 1).

Sugiyama et al disclose that the polyacetal resin composition further contains 0.02. to 3 wt.% of an antioxidant (D), 0.01 to 3 wt. % of a heat stabilizer (B) or 0.01 to 3wt.% of a weather (light) stabilizer (F). (claims 12-14)

Regarding the effects of the disclosed compositions, Sugiyama et al note that they are superior to conventional compositions prepared merely by melt-kneading the polyacetal resin with the thermoplastic polyurethane in the absence of any polyisocyanate compound in the following points: the affinity of the components for one another is improved; the surface layer of the molding is not peeled; no mold deposit is formed in the molding step; the weld strength, weld elongation and flex resistance are remarkably improved; an excellent impact resistance can be attained in a wide temperature range; and it is usable as a suitable material for automobile parts (such as clips, fasteners, trims, wheel covers, etc.). (column 7, lines 14-25)

(C) Comparison of the present invention and the cited references

One feature of the present invention that should not lightly be overlooked when reviewing the patentability of the pending claims resides in a specific combination of a polyacetal resin, a specific carboxylic acid hydrazide, a specific antioxidant, a specific processing stabilizer *and* a specific heat stabilizer. On the other hand, the cited references fail to disclose or suggest the above specific combination of the present invention.

Although Harashina discloses some aromatic hydrazides as a basic nitrogen-containing compound for combining a flame retardant comprising a phosphorus-containing compound and an aromatic compound, the hydrazides are only exemplified as one example of various nitrogen-containing compounds. Moreover, Harashina exemplifies naphthalene dicarboxylic acid hydrazide, biphenylene dicarboxylic acid hydrazide and the like as the same rank or level as other hydrazides such as aliphatic hydrazides, alicyclic hydrazides and monocyclic aromatic hydrazides. Therefore Harashina fails to teach the effectiveness of the specific carboxylic acid hydrazide as defined in the pending claims herein. Furthermore, Harashina has no teaching with regard to a processing stabilizer. Thus, the specific combination of the present invention is clearly different patentably from the composition of Harashina. And since Harashina does not appreciate technically the presence of the specific polycyclic aromatic hydrazide in combination with an antioxidant, a heat stabilizer and a processing stabilizer, the above specific combination as claimed herein would not be suggested.

Schuetz et al disclose a combination of a polyacetal resin, a melamine resin, an antioxidant and a heat stabilizer such as a hydrazide. Sugiyama et al disclose a polyacetal resin, a thermoplastic polyurethane resin, an antioxidant and a heat stabilizer. However, no suggestion is present in either Schuetz et al or Sugiyama et al about a processing stabilizer. Furthermore, as apparent from the fact that Schuetz et

al exemplify a hydrazide as a heat stabilizer, there is no concept to combine a specific hydrazide with a heat stabilizer. Thus the specific combination of the present invention is clearly distinct and would never be predicted from the cited references, even if Schuette et al and Sugiyama et al are combined with Harashina.

Applicant notes that the present invention also shows unexpected results. That is, as apparent from the fact that Harashina discloses naphthalene dicarboxylic acid hydrazide and the like as the same rank or level as isophthalichydrazide, benzoichydrazide or salicylichydrazide, improvement in mold deposit and bleeding property of the specific polycyclic aromatic hydrazide would never be predicted from Harashina. Moreover, since Schuette et al. and Sugiyama et al. do not use a specific hydrazide but a conventional heat stabilizer, inhibition of formaldehyde emission is insufficient.

In contrast, according to the present invention, since the specific polycyclic aromatic hydrazide is combined with other specific components (the specific antioxidant, processing stabilizer and heat stabilizer) for a polyacetal resin, mold deposit and bleeding are remarkably inhibited with formaldehyde emission inhibited. Such results are clearly supported by the Examples of the Description originally filed and would never be predicted from the cited references.

In view of the above, withdrawal of all rejections advanced under 35 USC §102(b) and 103(a) based on the cited references is in order. Such favorable action is solicited.

3. Fee Authorization

The Commissioner is hereby authorized to charge any deficiency or credit any overpayment in the fee filed, or asserted to be filed or which should have been filed

HARASHINA
Serial No. 10/573,824
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herewith (or with any paper hereafter filed in this application by the attorneys of
Customer No. 23117) to Account No. 14-1140.

Respectfully submitted,

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